

# Abstract

**Mohamed B Abdelhalem Osman**

## **An Analysis of x86-64 Instruction Set for Optimization of System Softwares**

A thorough analysis of an instruction set provides a fundamental step for development of highly optimized system software, applications and intermediate language. As one of the most abundantly used processor families, x86-64 instruction set is utilized in the development of a wide variety of applications. This paper provides an up-to-date analysis of the x86-64 instruction set on Windows 7 operating system for both 32-bit and 64-bit applications. To be able to study different types of applications, a set of executables and libraries from different software categories were chosen for the analysis. The results include the frequencies of the executed instructions, the average instruction lengths, the number of instructions for each number of operands and registers usage. The results show that the average instruction length is about 2 to 3 bytes. The mov, push and add instructions are the most abundant.